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Cloning sensations: mass mediated articulation of social responses to controversial biotechnology

Maja Horst

The 1998 announcement by American researcher Richard Seed that he intended to clone a human person for reproductive reasons created a large amount of journalistic attention and controversy in the Danish mass media. Developing a theoretical framework inspired by Bruno Latour, this paper analyzes the mass mediated articulation of this announcement as an exploration of the socially viable interpretations of human cloning within the controversial field of biotechnology. An inductive analysis of scripts employed by four national newspapers identifies four main scripts: *scientific education*, *pragmatic regulation*, *absolute resistance* and *fatalistic irony*. All scripts generally reject the idea of human cloning, but they are found to represent distinctively different forms of social response corresponding to the classification of different cultural dialogues on risk.

1. Introduction

On 7 January 1998, the morning news on the main Danish radio news channel, DR, brought the first report of an American scientist, Richard Seed, who had announced that he was now ready to clone people for the purpose of producing children for infertile couples. The statement was originally put forward at a scientific meeting in December 1997, but it wasn't until it reached American national radio on 6 January that it created headlines internationally (Nisbet and Lewenstein, 2002).

During the following days, this piece of news evoked a response in most Danish media. On 8 and 9 January, the Danish newspaper coverage focused on national as well as international reactions to Seed's announcement. Although the articles often included a perspective that questioned Seed's credibility, the announcement was nevertheless articulated as a sensation. The intention to clone a human being was presented as a potential disaster, which should be avoided, and Richard Seed was cast in the role of the villain against whom forces had to be mobilized in order to protect society. In the course of the next few days, however, the announcement came to be articulated in a different context. It emerged that the European Council had already prepared a declaration prohibiting human cloning and, although the signing of this declaration was not directly linked to the story about Seed, the coverage did imply a connection. It was presented as a more or less direct

consequence of Seed's announcement, and so it seemed that political action had been taken in order to prevent human cloning from happening.

The story about Richard Seed could have ended here. Viewed as a mediated narrative, the declaration from the European Council could function as a plausible ending, a narrative solution, which re-established a sense of calm in the articulations, order now having been restored. The story of Seed did not, however, disappear from the Danish mass mediated agenda in the following weeks. On the contrary, it continued to create attention, and measured in number of articles this particular announcement received more immediate attention than most other singular events within biotechnology in a $4\frac{1}{4}$ year period after August 1997, including, notably, the announcement that the human genome mapping project had been concluded in June 2000.¹

This paper takes its point of departure as curiosity towards the fact that this story created so much attention despite the fact that many commentators dismissed Richard Seed's claim as implausible at the same time as the European Union (EU) was reported to have banned human cloning. One probable factor behind this massive attention is the connection to the wide public debate following the spring 1997 announcement of the cloning of Dolly the sheep (Nisbet and Lewenstein, 2002; Einsiedel et al., 2002; Priest, 2001b; Neresini, 2000). It has been argued that this occurrence transposed the notion of human cloning from the realm of science fiction into the real world while at the same time revealing it to be a particularly explosive issue (Einsiedel et al., 2002: 340).² In general, Danish media coverage confirms this picture of human cloning as a particularly controversial issue.

Still, the amount of coverage of Seed's announcement is striking, since many of the media reports explicitly question whether the enormous amount of attention given to this particular story is in fact justified. In line with several academic studies of mass mediated coverage of science and technology these articles suggest that the level of attention is an expression of undue sensationalism.³ The issue of sensationalism, however, installs a normative perspective, which in itself does not explain the dynamics of the actual coverage. Accusing the media coverage of being sensational does not reveal anything about the way the media justify their decision to grant Seed's announcement so much attention. Instead of registering a "sensational" gap between the empirical facts (about cloning) and the articulation of these facts in the media, the accusation of sensationalism therefore becomes an important empirical fact in its own right. The newspaper articles themselves raise an explicit theme: the question of whether there are limits to what can be articulated as relevant and viable news in biotechnological controversies.

The point of departure for this paper can therefore be formulated as the following question: how has this occurrence, whose newsworthiness is explicitly questioned, generated such a large amount of media coverage? Departing from this question, the main thesis to be examined is that Seed's announcement generates attention because it can be used to accentuate central issues in current political controversies about the governance of science and biotechnology. Following this thesis, controversies about biotechnology are not perceived as simple deficits in the understanding of and communication about science, but rather as fundamental political disagreements about the role of science in the shaping of "the good society."

2. Conceptual background and methodological approach

The proliferation of controversies about biotechnology has been a common topic for academic analyses of current public understanding of science (Bauer and Gaskell, 2002;

Condit, 1999; Van Dijck, 1998; Mulkay, 1994, 1997; Nelkin and Lindee, 1995). The causal relationship between controversy, technological development and public understandings, however, is not described as simple.⁴ Most studies seem to imply a mutual relation of influence in the development of science and technology and the public controversies concerning these developments. Technological development brings new challenges to the public understanding, but technological development is at the same time shaped by public controversies.

The present paper adopts this notion of mutuality. Controversies are not presented as instances of badly conducted diffusions of technology. Instead they are perceived as points of condensation in a shaping process where both technologies and public understanding of these technologies are continuously negotiated in a particular cultural and social setting. This is in line with previous studies that have used scientific controversies as a condensed or exemplary empirical site for the study of the relation between science and society (Nelkin, 1995a; Engelhardt and Caplan, 1987). The paper works from a definition of controversy as a situation in which different notions of problems and solutions are explicitly in conflict with each other. Following this definition, the basic questions to be explored focus on the way Seed's announcement is constructed as a problem, as well as the kinds of solutions that are suggested to these problems: what kind of societal response is considered appropriate to Seed's announcement? This analysis not only enables us to interpret controversies about biotechnology as more than a flawed process of diffusion, it also allows us to learn new things about the broader cultural context in which these controversies are embedded—in this case, Denmark.

In general, Denmark is characterized by high levels of general education, cultural homogeneity and a consensus-seeking political culture (Knudsen, 1996; Pedersen et al., 1994). The underlying ideal of the Danish political tradition is that public debate is necessary for establishing legitimate closures in the form of solutions to controversies. Methods of facilitating public deliberation on science and technology have therefore been implemented in various ways over the past 20 years, with the consensus conference as the best known example (Andersen and Jæger, 1999). The institutionalization of public debate about biotechnology, however, has not made controversies ease or diminish, let alone solved them (Jelsøe et al., 1998). Controversies about biotechnology are as widespread as ever, and conflict and confrontation are central to the mass mediated coverage of biotechnology in Denmark (Gutteling et al., 2002).⁵ On this basis, Denmark can be seen as an interesting setting for a case study of the relationship between the dynamics of biotechnological controversies and broader notions of the governance of science in society.

The study of the mass mediated representations necessitates some particular methodological considerations. Although the paper will not argue that the mass media can be seen as an unproblematic implementation of the democratic ideal of a deliberative public sphere (Habermas, 1991), it will propose that the mass media is a central source of information and debate in contemporary societies and therefore should be perceived as a major arena for public debate about political issues such as biotechnology and science governance (for a similar argument see Allan, 2002; Friedman et al., 1999; Gregory and Miller, 1998). However, the mass media cannot simply be viewed as a neutral mediator of various constructions of meaning concerning biotechnology. In line with a constructivist perspective on media sociology,⁶ mass mediated representations are here perceived as the outcome of a productive process in which a phenomenon or an occurrence is shaped into a newsworthy story. This perspective does not imply that journalists can construct news in any way they see fit. Journalists do not write fiction, but have to make news out of the admittedly large, but also limited, number of available occurrences, sources and sustainable interpretations.

So although news is a constructed reality, there are limits as to how meaning can be produced. In this sense, the creation of news is not fundamentally different from other social practices of creating socially viable representations of phenomena in the world.

In order to make this connection central, the present paper builds on a Latourian framework (in particular Latour, 1999, 1987), rather than on constructivist media sociology. The reason is that the relational ontology of Latour and his focus on productive associations make it possible to be explicit about the implicit notions in constructivist media sociology, namely, that news production is only *one* among many interconnected ways of articulating socially viable representations of the world. Between the scientific construction of facts in the laboratory and the front page of a newspaper there is a chain of transformation rather than a gap of correspondence between object and representation (Latour, 1999: 69–73).

Drawing on a similar conceptual background Neresini (2000) has analyzed the coverage of Dolly in the Italian press. His analysis focuses on how mediated translations establish cloning as a scientific fact. In contrast, the present analysis will stress that although journalists construct the news, they do not do so without relations to the rest of the world. We can speak of the journalistic work as a question of creating networks or as Latour puts it: “exploring the collective. Any entity is such an exploration, such a series of events, such an experiment, such a proposition of what holds with what, of who holds with whom, of who holds with what, of what holds with whom” (Latour, 1999: 162). The central point in this context is that not everything can be associated. The productive process of news writing, in fact, is precisely a question of exploring the collective by testing possible connections, and the result is the interpretation of a given occurrence or statement, which is viable in the particular context. It is against this background that it is possible to use mass mediated representations as data in a study of biotechnological controversies and their relation to broader social and political conflicts about governance of science and technology.

In analyzing news in this way, the concept of *inscription* becomes crucial. Inscription refers to the types of transformations through which an entity becomes materialized into a sign or a trace (Latour, 1999: 306). When a specific interpretation is ascribed to an occurrence like the announcement of cloning, it is because it is associated with other occurrences and sources in a particular way. Sources are assigned different roles (as researchers, politicians, citizens) just as non-human actors are aligned in order for the news story to make sense. In the present context, the process of making sense by aligning a network of articulation is termed *inscription* and a particular pattern of inscription will be termed a *script*. Identification of scripts is therefore seen as a means to investigate the controversies about biotechnology in a way which understands the inscription of any particular occurrence as an act of articulation that simultaneously articulates the rest of the collective, including general notions about science, technology and society. In this particular context the focus of the analysis is to understand the articulation of Seed’s announcement as controversial. The qualitative analysis of inscription has therefore been conducted from the following research questions:

How is Seed’s announcement described as a problem?

What are the suggested solutions to this problem?

Following the definition of controversies as points of condensation, where different notions of problems and solutions are explicitly in conflict, it must be expected that it is possible to identify more than one script in the mass mediated articulation of Seed’s announcement. The ambition of the following analysis is precisely to identify this set of scripts, and their different definition of problems and solutions, as a summary of the viable ways of inscribing Seed’s announcement in “the collective”—in this case the particular Danish context.

Within this conceptual framework the present analysis of the Danish coverage of Seed's announcement is based on the total number of articles in four different newspapers in a three-week period from 7 January 1998—a total of 54 articles. The four sampled newspapers have been chosen because they represent a broad spectrum of national newspapers. Two of them are large national broadsheets, the social-liberal *Politiken* and the conservative-liberal *Jyllandsposten*, whereas the third is an intellectual and critical niche newspaper (*Information*) and the fourth is a tabloid (*Ekstra Bladet*). As could be expected a comparison shows a great deal of difference in the way the four media have edited their coverage of the story of Seed. Generally, the two big national newspapers, *Politiken* and *Jyllandsposten*, have printed the great majority of the articles (21 and 20 respectively) while also keeping the story running for the longest period of time. The coverage in the other two newspapers is less extensive and spans a shorter time period (*Information* eight articles and *Ekstra Bladet* five articles). It should be noted that the analysis includes journalistic articles, letters to the editor and other debate contributions, since the purpose is to investigate the whole spectrum of inscriptions of Seed's announcement.⁷

Below, the main patterns in these inscriptions will be identified. All articulations reject cloning as a legitimate means of human reproduction, but there is great variety in the reasons for this rejection. Generally, the inscriptions of cloning focus on technical, regulatory or wider societal aspects when constructing the notion of human cloning as a problem, and this division has therefore been employed to structure the analysis.

3. Articulation of technical aspects

Many of the inscriptions primarily articulate the technical problems of human cloning. Cloning is presented as a technical procedure, which should be evaluated according to its technical viability. A central issue seems to be the probability that Seed will actually succeed in cloning a person, both in terms of the present stage of the technology, but also in terms of whether *his* technical skills are adequate. Several comparisons to the cloning of Dolly are put forward, and are often used as a means of evaluating the probability of technical success as well as a general evaluation of the technical problems in human cloning:

The “fathers” of Dolly the sheep reject the possibility of cloning people at this stage. . . . Harry Griffin's argument is not that it isn't theoretically possible. The cost and risk of trying are simply far too great. . . . In order to make Dolly we used 277 fertilized eggs, which required 430 un-fertilized eggs. Every donating woman in Seed's experiment can supply 10–12 eggs, but in the clinic the fertilization will only be successful in 10–20 per cent of the cases. This means, that Seed needs between 100 and 300 donating women to make one child. This is the first obstacle, says Harry Griffin.—The second obstacle is worse. As surrogate mothers these women will carry all the defective experiments—dead foetuses, abnormal and deformed children. Abortions and even birth of handicapped children will follow, so who will volunteer, asks Harry Griffin.⁸

The implications of this comparison with Dolly are clear. It is assumed that it is roughly the same kind of technical endeavor to clone a human, but it was only because this experiment was performed on sheep that the costs in terms of dead and abnormal fetuses were acceptable. Cloning is thus articulated as a more or less neutral technical procedure that can be applied to different ends. In itself the technique is not controversial, even though it might be demanding and even exciting. Rather it is the particular application to humans, which is problematic.

Technical evaluations are also applied to articulate future possibilities and implications of human cloning. Although they often leave open the question of whether or not it will actually be possible to clone a person one day, a central feature is a preoccupation with scientific knowledge or facts. They rely heavily on scientific expertise by including quotations from researchers articulated as scientific authorities and by presenting scientific facts as the basis of the assessments. In this way the articulations can be understood as efforts to enhance the implied reader's factual knowledge about science and generally the scientific knowledge is presented with emphasis on the hopes connected to genetic research and a basic faith in the scientific community:

Cloning and recombinant DNA research are not just notions from science fiction, which researchers grapple with in order to prove their own virtuosity. The most important applications and the most important objectives of research come via these new techniques for developing new treatments, diagnoses and pharmaceuticals for the benefit of people all over the globe. And this trend started long ago. In this connection human cloning is merely to be seen as a curiosity—at least for the time being.⁹

As this quotation implies, Richard Seed is often articulated as an exception to a general rule according to which science is a means to create a better world. Many of the articles explicitly establish a distinction between genetic researchers in general and Seed, who is often presented as a complete outsider. He is articulated as not having the right credentials, and therefore he should not be trusted to be able to do what he claims. As a leading gynecologist puts it:

I have very little confidence in the American, Richard Seed, who believes that he will soon be able to clone humans. Nobody has seen his name in acknowledged scientific journals. He is, as far as I have understood, not even a medical doctor, but a physicist.¹⁰

In this way human cloning is articulated as an anomaly. It is the exception to the rule of science as a beneficial activity in society. Seed is an outsider to the scientific community and it is wrongful science to clone a human, since the procedure has not yet been perfected on animals. These inscriptions also imply that it is unlikely that Seed will succeed in actually cloning a person, since it is so difficult and costly in terms of both money and participants. Yet, it is not ruled out that it is possible, but only argued that under the present circumstances it is irresponsible.

4. Articulation of regulatory aspects

A second type of inscription focuses on regulatory aspects and presents human cloning as a problem that can be dealt with in terms of political, social or professional regulation. These inscriptions do not question the scientific plausibility of Seed's announcement, but ask what type of regulation is necessary in order to prevent this kind of deviant behavior. They all unanimously back the intentions of the EU declaration against cloning and articulate prohibition as an obvious precaution against the dangers of cloning:

Tomorrow Denmark and 11 other European nations will sign a declaration, which prohibits human cloning. All other countries ought to follow as soon as possible. We will undoubtedly hear several worn-out phrases about not being able to hinder progress and that inventions cannot be undone. It will not hold. That something is possible does not automatically mean it has to be permitted. The technologies of cloning are an

instance of scientific progress, which must be met immediately by restrictive international legislation.¹¹

The particular articulation of Denmark as a regulative arena is interesting as many of the articles specifically refer to the fact that Denmark has already had a statutory ban on research in human cloning for some time. The implication seems to be that Denmark is somehow in the forefront of “ethical” regulation of biotechnology. Sometimes this is made explicit: “It gives us a global responsibility to show the rest of the world that a ban is most effectively enforced when it is based on the ethical views in the population.”¹² It is interesting to note how ethics in this context is articulated as an essence. Ethical views seem to be a substance in the population; a population which is furthermore presented as a unified container for this substance. The ethical views of the Danish population are somehow a unified entity that can be measured and compared to legislative regulations—as if they were independent from each other at the outset.

In several of the articulations of regulatory aspects it is questioned whether legal constraint is the most desirable form of control or whether there are better options. A major issue is the question of freedom of research versus external regulation of research. Although there is support for the European ban on reproductive cloning, it is sometimes presented as premature to create more statutory regulation since there is still far too little scientific knowledge about cloning. In these cases it seems that if we establish a ban on cloning in general we might prevent research that will later prove useful:

The immediate reaction to the news about researchers experimenting with human cloning is to impose a total ban on cloning. But that requires a scientific definition of the limits of acceptable experimentation in the fight against genetic diseases, and we have not yet gotten that far.¹³

The assumption implicit in this quotation is an expectation of great positive outcomes of future medical science. The objective of regulation should be not to limit these possibilities unnecessarily. In this way many of these articulations engage in questions of striking the right balance between restriction and permission, thus articulating a distinction between “good research in animal cloning”¹⁴ and “bad” research in human cloning.

Another issue concerning regulatory aspects and freedom of research is the question of who should be in charge: “Is it legislation, public opinion or the personal ethics of researchers, which will determine whether or not we can welcome the first little cloned baby to the world in a couple of years time?”¹⁵ This issue is naturally linked to the question about striking the right balance in regulation—the argument about legislation being premature leads to arguments in favor of leaving it to professional standards and collegial pressure. “I don’t think any proper medical doctor would give it a try. He or she would be frozen out of the scientific establishment.”¹⁶ Other articulations pinpoint public opinion as an important factor: “The most effective weapon is debate and resistance in the public together with condemnation from scientific colleagues.”¹⁷ So it seems that although there is unanimous agreement that human cloning should not be performed, there are different articulations of the preferred means of regulation.

5. Articulation of wider societal aspects

A third kind of inscription does not focus on the particularities of human cloning but articulates Seed’s announcement as a symptom of a more general problem of science and modern society gone awry. These inscriptions do not deal with concrete technical or

regulatory aspects of the particular case. Rather the announcement is presented as an important event because of its symbolic implications. Seed's announcement is not a problem in itself, but it is a symbol of science as a problematic activity in general:

When we concern ourselves with Seed's fantasy, it is obviously in the light of a fear that the seed he has sown will one day grow into something that could become reality. . . . Dizzying perspectives present themselves: Eugenic cloning of particular supermen, hosts of genetically identical parents and clone-children—or the establishment of banks with humanoid transplant organs, possibly in the form of headless homunculi, which only exist as a stock of spare parts such as hearts, livers, kidneys and so on.¹⁸

This third group of articulations differs from the others (on technical and regulatory aspects) in the status they grant to Seed. Viewed as a symptom it is unimportant whether or not Seed is able to actually clone human beings. The mere proclamation that he intends to do so is enough. Besides, even if he does not succeed, other scientists with better skills and more resources will surely follow him and succeed where he has failed. Thus, Seed is not presented as an outsider, but as a typical scientist doing what other scientists do. Given this background it can be articulated as natural, albeit in a satirical mode, that Seed's intentions should be associated to visions of other scientists speculating about future uses of gene technology:

Naturally it will be a problem to create a human, animated creature, which will serve solely the purpose of being another human being's potential organ donor. But here Dr. Seed can get assistance from another idealist, Professor Slack from Bath University in England. Professor Slack is an expert in embryonic development and gene technology and has recently managed to create a frog embryo without head or tail. The professor has simply turned off the genes which control the development of head and tail, for which reason only a torso will be developed, a bag of organs, which will never be able to stare accusingly and ask "why?".¹⁹

Although satire is often used as a way of creating ironic distance, these visions are nevertheless articulated in a factual way, rendering them not wholly implausible. As in the previous sections on technical and regulatory aspects, human cloning is not the least bit desirable, but the implications of Seed's announcement are articulated as far more significant. In contrast to the articulation of technical aspects, it seems probable that human cloning will happen and that it will have widespread dystopian consequences. In distinction to the articulation of regulatory aspects, there is no pragmatic evaluation of possible valuable outcomes of this kind of research. Seed's announcement is a symptom of a general societal trend, one that is deeply reprehensible. It is therefore not just Seed's announcement, or even the probability of cloning which is the problem. Rather these problems are symptoms of a much broader set of problematic developments, leading directly to the creation of "headless organ banks" and other instrumental exploitations of human life. Science in general and its societal role is the "real" problem in these articulations.

In terms of solutions, however, these inscriptions of cloning as a symbol of problematic social changes lead to the articulation of two distinct responses. In some articulations a *general resistance* towards the changes is given as the proper way of reacting to Seed's announcement:

What if the only response to human cloning, this most recent example of the striving in the natural sciences to invent, map out, and be masters of God and everything, is either acceptance or resistance. In that case, I resist. First and foremost for obvious social reasons, when not only respectable men at the Panum Institute [the medical faculty of

Copenhagen University] but also madmen in remote and exotic laboratories are in a position to reproduce an army of new Hitlers.²⁰

In these articulations resistance to cloning should not be differentiated since no forms of cloning are more acceptable than others: “The answer to cloning just has to be ‘no.’”²¹ The cloning of a human being is irretrievable and appalling. In this light, resistance is not a matter of striking a pragmatic balance between “good” and “bad” science. On the contrary, genetic scientists are presented as fundamentally untrustworthy, and therefore society must take action, securing resistance in the form of universal prohibition. Resistance is articulated as a means of drawing a line that fundamentally constrains scientific exploration.

Other versions do not present any prescriptions for action that could serve as remedies against the dystopian development. Instead they adopt a *fatalistic stance* where action is more or less pointless since research is outside all forms of control:

Only nature can stop a man like him [Seed]. Like it has stopped all of his predecessors, because the perverted dream about creating humans in one’s own image is almost as old as humankind itself. Nevertheless it cannot be denied, that the dream—or nightmare—has moved closer to fulfilment. Hitler, Himmler and all the others would rub their hands in glee if they had had Richard Seed’s technology at their disposal.²²

In these fatalistic articulations science is fundamentally rejected as a beneficial activity, but this rejection is articulated from a standpoint that assumes any form of influence is impossible. Research has gone astray and the only thing we can do is to laugh at it: “We are going to laugh at him. The mere fact that his name is Seed! He is sowing the seeds of vanity and arrogance.”²³ Fatalism thus seems to be the obvious response to a trend that is basically reprehensible, but at the same time beyond our control.

6. Four scripts of the appropriate social response to human cloning

Based on the previous analysis four different patterns of inscription, i.e. scripts, can be identified (Table 1). Each of these scripts constructs the problem of cloning and its solutions in a specific way and thereby they point to four distinct forms of social response to biotechnology. This spectrum of possible social responses has important consequences for the understanding of controversies about science and technology.

The pattern identified in the inscriptions focused on technical problems can be termed *the script of scientific education*. In this script Seed’s announcement primarily reveals Seed himself to be irresponsible; i.e. he does not adhere to scientific and rational evaluations of

Table 1. Social responses to cloning

Script	Articulation of Seed	Problem	Solution
Scientific education	Outsider—and probably harmless	Unnecessarily frightened public and bad reputation for science	Information and knowledge diffusion
Pragmatic regulation	Outsider—points to a need for regulation	How to regulate against human cloning without preventing “good science”	Pragmatic evaluation of pros and cons in regulation
Absolute resistance	Normal scientist	Symptom of harmful trends	Resistance and delimitation of scientific development
Fatalistic irony	Normal scientist	Symptom of harmful trends outside control	Fatalistic detachment

what is sensible and feasible. In itself this is not a very big problem since it is presented as highly unlikely that he will succeed in actually cloning. It is, however, articulated as problematic that his announcement can give science a bad reputation if the general public believes in Seed and thinks that human cloning is just around the corner. The problem in this script is therefore primarily presented as a lack of knowledge about the current scientific possibilities and the appropriate solution is to inform the public about relevant technical details and factual information. Generally, the social response to problems with biotechnology in this script can be seen to be similar to the “deficit” model in public understanding of science, where controversies about science are often perceived to be caused by lack of scientific knowledge on the part of the public (Irwin and Wynne, 1996). In this context the argument seems to be that if only the public were properly educated about science, they would not believe in horror stories presented by maverick scientists like Richard Seed, just as they would probably also be less skeptical towards biotechnology in general.

The inscriptions focusing on regulatory aspects display a pattern that can be termed *the script of pragmatic regulation*. Unlike the previous one, this script takes the technical plausibility of cloning for granted and asks what kind of control system would be relevant in order to prevent human cloning from happening. The main problem with cloning is to strike a pragmatic balance between granting permission to those who pursue beneficial research and prohibiting the activities of those researchers, like Seed, who pursue unwanted goals within scientific research (such as the cloning of humans). Whereas controversies about science in the previous script were perceived to be caused by a deficit of understanding on the part of the public, this script presents them as an integrated and normal part of scientific development. Science, in general, is regarded as a valuable activity in society, but it is also seen to produce outcomes which are not all perceived as beneficial by the rest of society. Since the system of science cannot be expected to prevent these negative side effects on its own, external regulation is necessary to make sure that science is kept on the right track. This social response to controversies about science and technology can therefore be seen to be similar to more recent formulations of the necessity of re-thinking the communication relationship between science and society in a more interactive manner than presented by the “deficit” model (Nowotny et al., 2001; Miller, 2001; Joss, 1999; Locke, 1999; Durant, 1999). Despite their differences, these authors all stress that science should engage in a dialogue with other parts of society in order to make the scientific knowledge socially robust and democratically accountable.

The third set of inscriptions focuses on the wider societal aspects of the announcement of immediate human cloning. The common feature here is that Seed’s announcement is a symptom of a broader social trend. Seed is not articulated as an outsider but as an example of a typical scientist. So it is not so much Seed’s announcement that is the problem, but rather the general development within science. As illustrated earlier, these inscriptions present two different solutions or possible societal responses to the situation, which can be seen as two distinctively different scripts. They can be labeled *the script of absolute resistance* and *the script of fatalistic irony* respectively. Both of these scripts articulate the societal trend, of which human cloning is the symptom, as reprehensible. But there are decisive differences in the way this trend is articulated. In the script of absolute resistance it seems to be possible, and also necessary, to fight scientific progress. In the script of fatalistic irony, however, the trend is not something that can be curbed. The difference is one of different implied readers of the scripts. The script of fatalistic irony implies a reader who is without influence. Detachment is therefore articulated as the obvious response. The script of

absolute resistance, however, implies a reader who holds some measure of power to affect the course of events. Accordingly it articulates the need for resistance, and raises a call for action. Taken together these two scripts demonstrate a very important point in relation to the study of public understanding of science. Rather than merely being a question of lack of understanding or communication about science, they imply fundamental political disagreement about the role of science in the shaping of “the good society.”

A striking difference between these four scripts can be said to be the divergence in the articulation of science and scientific trends. The difference is comparable to the rhetorics of hope and fear as identified by Mulkay (1993) in the analysis of the British debate about embryonic research, a similarity that is also pinpointed by Einsiedel et al. (2002) in relation to the issue of cloning. As in the rhetoric of hope, where science is presented as the means to create a better world, both the script of scientific education and the script of pragmatic regulation articulate science as a fundamentally beneficial activity. In this context, it should be noted that the solutions proposed to the controversies in both these scripts are similar to the notion of communication as a means to solve controversies between science and society within the academic discipline of Public Understanding of Society. Whether as diffusion of information or as democratic dialogue, communication about science is seen to be the means to solve controversies.

In contrast, the scripts of absolute resistance and fatalistic irony articulate science as a fundamentally problematic activity, much in line with Mulkay’s identification of the rhetoric of fear. Science is presented as an activity beyond our (and perhaps out of) control, proceeding according to its own disconnected and undesirable norms. The rejection carried by the script of absolute resistance is not one that implies the exercise of control in order to turn biotechnological research towards acceptable trajectories, but an act of resistance in terms of a fundamental—one could say dogmatic—rejection of the whole logic or rationality of contemporary genetic science. By contrast, the script of fatalistic irony articulates detachment as the obvious social response to this development run wild. In contrast to the two previous scripts, communication is not seen as a means to solve controversies in these scripts. At most, public communication can be used as a way to call for opposition in the script of absolute resistance. This use, however, is not seen as a means to solve controversy, but rather to engage in confrontation. Certainly, communication has no use in the script of fatalistic irony, where science is perceived to be completely outside of control.

Building upon these observations about the use of communication, however, the four scripts do point to some differences, which are not captured by the distinction between the rhetorics of hope and fear. The articulation of science as either beneficial (the rhetorics of hope) or problematic (the rhetorics of fear) simultaneously implies a particular articulation of all the other associated entities of the network. Each of the scripts implies a specific articulation of the collective, i.e. of the general social order of society in which science, publics and biotechnology are part. It is therefore not only science that is articulated differently in these scripts, but society and social order in general. When the four scripts disagree about the role of science in shaping “the good society” it is because they disagree about the fundamental definition of this “good society.” A more general conflict about the preferred social order is therefore part and parcel of the controversies about biotechnology.

The conflict between these articulations of social order can be pinpointed by a comparison to the fourfold typology of the culture theory described by Mary Douglas and collaborators (Douglas, 1996, 1997; Thompson et al., 1990; Douglas and Wildavsky, 1983). According to Douglas four kinds of competing dialogues about risk can be identified in society:

The basic discriminator is the attitude to power and authority: There are two ways of exerting power, one bureaucratic and hierarchical, and the other by bargaining and exchanging; there are two ways of resisting the influence from these bases, one by active criticism, and the other by withdrawal. The four cultural types that are thus distinguished (you can call them hierarchy, market, critical activist, and isolate) are always in flux, always open to conversion to one of the other positions. (Douglas, 1997: 129)

In the present context these four competing dialogues of risk can be used as a theoretical shortcut to a demonstration of the different social orders implied in the four scripts of social response to Seed's announcement.

The proposition behind this comparison is that the scripts of *scientific education* and *pragmatic regulation* can be equated to the center positions of hierarchy and market, respectively, whereas the scripts of *absolute resistance* and *fatalistic irony* can be compared to the peripheral positions of the critical activist and the isolate. Accordingly, *scientific education* takes place within a hierarchical system of knowledge claims. The problem of cloning can be solved by adhering to the rules laid out in the scientific hierarchy—Richard Seed should follow his peers and the public should believe in the scientifically established knowledge of right and wrong. *Pragmatic regulation* on the other hand, takes place within an exchange system (the market), where different knowledge claims have to be weighed against each other in order to select the most beneficial solution. Actors such as Richard Seed, other genetic researchers, politicians and citizens can all be constructed as individual actors with their own incentives and interests and the logic of the exchange system is to try to reach a solution which most actors can accept. The crucial point in both these scripts is that it is possible to act within an existing framework of society (either in terms of the hierarchy of science or the market of political preferences) in order to prevent cloning from happening. Existing social order is basically articulated as positive and current systems of control are presented as sufficient in order to secure sensible and efficient progress in biotechnology as well as in society at large.

In contrast to this and with clear parallels to the analysis of environmental organizations by Douglas and Wildavsky (1983), *absolute resistance* takes place within a sect of critical activists, where the chosen few have seen the light and therefore are constructed as the opposition to mainstream society. And finally, *fatalistic irony* and detachment is the obvious social response of isolates, constructed as having no influence on their societal situation, since social order is perceived as chaotic or at least in the hands of some unknown, uncontrollable force. In these scripts there is no perception of current social order as positive. Rather, society is ruled by forces that are wrong or outside of control and therefore contemporary social order is seen to be a threat to the good life of the community of ordinary people.

The comparison with Douglas' cultural forms is important because it illustrates how the different inscriptions of cloning and their resulting social responses are linked to notions of society, social order and forms of social organization. Accordingly, it is possible to argue that responses to cloning and biotechnology should be understood in connection with general patterns of political opinions or ways of thinking about society. Controversies about biotechnology are not just disagreements about biotechnology, but should be seen as general ideological conflicts about the preferred order of society.

Further analysis of the connection between cultural theory and responses to biotechnology is outside the scope of this paper. Still, one last comment should be made about the comparison with the structurally defined thought styles of Mary Douglas, since it implies questions about the materiality of the four forms of social response. It is necessary to stress

that the scripted forms of response have been located on a discursive level. They are standard formulations of the appropriate social response in the different scripts, but they are not identified as the attitudes of individual human beings. Furthermore this analysis has no intention of claiming any structural necessity in the fourfold schemata. The four forms in this paper have been inductively defined, and subsequently they have been compared to the structurally defined forms of cultural theory.

7. Conclusion

The notion of inscription has proven useful in the development of a framework for understanding mass mediated news and, specifically, in interpreting a controversial announcement about biotechnology. This framework can be seen as offering the possibility of combining social studies of science and technology with constructivist media sociology, by pointing to the similarities between these fields of study. Central for both is the assumption that entities such as scientific facts or mediated news do not exist as fixed and stable entities outside the—in principle unlimited—networks in which they are produced. Rather, both facts and news are seen as productive elements in the exploration of the collective and as such it should be possible to study news production as the extension of laboratories and laboratories as extensions of the newsroom. Although the chains of translation between these different settings might be long and complex, there is no fundamental ontological difference between the production of facts and the production of news.

Whereas these chains of translation have not been the object of study in the present paper, they offer an exciting empirical field for further study. Certainly, the increasing interest devoted to the interface between science and society warrants a more integrated perspective in the study of interconnections between science and media. The argument of the present paper is that these interconnections should be studied as integrated elements of the exploration of the collective: what and who holds with what and whom? In this sense, public understanding of science cannot be studied without a simultaneous interest in the workings of the institution of science and the institution of the mass media.

Against this background, the present analysis has been guided by the assumption that biotechnological occurrences like the announcement of Richard Seed generate a lot of attention in the mass media because they accentuate central issues in current political controversies about the governance of science and biotechnology. Rather, than stressing the cultural unanimity in Denmark and homogeneity in the mass mediated coverage, the paper has been occupied with an exploration of the internal differences in the articulation of cloning as a problematic field of research. Four scripts of scientific education, pragmatic regulation, absolute resistance and fatalistic irony have been identified as patterns in this articulation. As scripts, they interpret the occurrence of Seed's claim into a coherent news story by associating it with other occurrences and actors in particular ways, and thereby they testify to the exploration of the collective in its articulable forms.

The purpose of the analysis has not been to try to differentiate between these different inscriptions in order to deem some of them more serious and others more sensationalist. On the contrary, it has been the intention to show how different scripts imply different social responses to cloning and that they are all linked to fundamental notions of social order and the role of science in society. Viewed as conflicting inscriptions of biotechnology, the controversies are not just controversies on singular aspects of biotechnology, but are also ideological conflicts about the "right" way of organizing society. In this way, the controversies demonstrate science and technology to be a truly political field of contestation and

antagonism. Hence, the field of public understanding of science is a very central field of study in relation to a description of contemporary society.

The important argument of the paper is that studies of controversies about science and technology need to understand the field of public understanding of science as a phenomenon that is intrinsically linked to notions of social order and political conflicts about the role of science in shaping future society. As Irwin and Michael (2003) have argued, any "understanding" of science on behalf of the public is co-constructed with an understanding of society, and therefore the study of Public Understanding of Science should be extended to a study of Public Understanding of Science and Society. In this context, the present analysis has shown that the rejection of science, as it is articulated in the mass mediated inscriptions of cloning, is linked to conceptions of society and social order as deeply problematic. Consequently, the opposition to science does not seem to be one that will simply disappear with the introduction of more communication about science and enhanced forms of dialogue. These solutions, or answers to controversy, proposed within the academic discipline of Public Understanding of Science seem to be integrated elements of the controversy, rather than therapies (or "fixes") that can be employed from the outside in order to solve controversies. Information or dialogue are not external elements but are integrated in the fight. The call for information and dialogue is also part of what the controversy is about, not something that is imposed as a solution from the outside. In this way, the analysis can be seen to point to some limits in the use of communication and dialogue as a means to solve controversies. It must be an open question whether the notions articulated in the scripts of absolute resistance and fatalistic irony can be changed or influenced by the efforts to establish a democratic dialogue about science.

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Notes

- 1 This particular case study is conducted within the framework of a larger study of the articulation of biotechnology in four Danish national newspapers within a 4½ year period from August 1997, which has included quantitative as well as qualitative content analysis. In the counting of frequencies of different topics in the coverage of health care related biotechnology, human cloning has been found to be the most frequently articulated application of biotechnology. In this context it should also be noted that human cloning has been an object of discussion since the beginning of the 1980s; see for example the report from the minister for the environment: *The Price of the Future* (Ministry of the Environment, 1984). Human cloning has been prohibited by law in Denmark since 1987.
- 2 These analyses point out that the idea of human cloning revives the powerful myth of Frankenstein (Turney, 1998), at the same time as human cloning is perceived as a fundamental threat to notions of individuality and uniqueness, which are held sacred in most Western cultures (Priest, 2001b; Hopkins, 1998). Priest, however, also emphasizes that this issue has proved to be titillating, yet harmless to industry and other influential actors. She argues that this is an explanation for its massive coverage since the media tends to follow "paths of least resistance."
- 3 The critique is common from scientists, but also social scientists can be found to share the view (see for instance Nelkin, 1995b). In connection with the mediated coverage of cloning the critique of sensationalism is discussed in Gunter et al. (1999). On a general level Stocking (1999) has tried to nuance this critique.
- 4 For example, Nelkin and Lindee (1995), Van Dijck (1998) and Condit (1999) have focused primarily on popular images of biotechnology on the basis of a hypothesis that representations have a major influence in shaping the public understanding of these technologies. Other studies, such as those of Mulkay (1997) and Priest (2001a), have primarily tried to understand the controversies as expressions of cultural conflict that shape the conditions of possibility for developing technology.

- 5 In the comparative study of European countries Gutteling et al. (2002) argue that the mass mediated coverage in Denmark is the most negative in Europe.
- 6 For an international overview of social constructivism within news production see Berkowitz (1997).
- 7 All the quotations used to illustrate the analysis have been translated into English; this job has not always been easy since the articles often employ strange sentences and mixtures of metaphors. The translations have therefore been kept as literal as possible.
- 8 "Baby cloning is unlikely," *Politiken*, 18 January 1998.
- 9 "New and better medicine," *Politiken*, 18 January 1998.
- 10 "Danish doctors reject cloning," *Jyllandsposten*, 12 January 1998.
- 11 "Copy humans," Editorial in *Jyllandsposten*, 11 January 1998.
- 12 "Debate on cloning brings great emotions to boil," *Jyllandsposten*, 12 January 1998.
- 13 "WHO: Cloning of humans is reprehensible," *Jyllandsposten*, 9 January 1998.
- 14 "Clinton wants to ban cloning," *Politiken*, 2 February 1998.
- 15 "Debate on cloning brings great emotions to boil," *Jyllandsposten*, 12 January 1998.
- 16 "Danish doctors reject cloning," *Jyllandsposten*, 12 January 1998.
- 17 "WHO: Cloning of humans is reprehensible," *Jyllandsposten*, 9 January 1998.
- 18 "Homunculus," Editorial in *Politiken*, 11 January 1998.
- 19 "Man of Seed," Editorial in *Information*, 9 January 1998.
- 20 "Man in the machine," *Politiken*, 18 January 1998.
- 21 "Europe against cloning," *Jyllandsposten*, 13 January 1998.
- 22 "Frankenstein's heir," *Ekstra Bladet*, 9 January 1998.
- 23 "The sheep, man, and the bishop," Editorial in *Ekstra Bladet*, 9 January 1998.

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